

CLAIMS:

What is claimed is:

1. An aromatic polyester polyol having an acid number below 3.0 mg/KOH/g, wherein said aromatic polyester polyol is the reaction product of a reaction mixture comprising:
 - (a) an acid component;
 - (b) a glycol component; and
 - (c) a urethane catalytic activity agent that comprises a non-alkoxylated aminoalcohol.
- 10 2. The aromatic polyester polyol of claim 1 that has an average hydroxyl functionality less than 4.0.
3. The aromatic polyester polyol of claim 1 that has a polyurethane foam reaction polymerization rate that is increased by at least 50% by the presence of said urethane catalytic activity agent.
- 15 4. The aromatic polyester polyol of claim 1 wherein said non-alkoxylated aminoalcohol is a non-alkoxylated tertiary aminoalcohol.
5. The aromatic polyester polyol of claim 1 wherein said urethane catalytic activity agent further comprises a metal esterification catalyst.
- 20 6. A blend comprising (i) one or more blowing agents, surfactants, catalysts, or a combination thereof and (ii) the aromatic polyester polyol of claim 1.
7. A polyisocyanurate foam prepared from the aromatic polyester polyol of claim 1.
- 25 8. A polyurethane foam prepared from the aromatic polyester polyol of claim 1.
9. An aromatic polyester polyol having an acid number below 3.0 mg/KOH/g, wherein said aromatic polyester polyol is the reaction product of a reaction mixture comprising:
 - (a) an acid component;
 - (b) a glycol component; and
 - (c) a urethane catalytic activity agent comprising at least one of a non-alkoxylated aminoalcohol and a metal esterification catalyst, wherein:
 - (i) said aromatic polyester polyol has a polyurethane foam reaction polymerization rate in an HCFC-141b blown system that is increased at least 367% by the presence of said urethane catalytic activity agent;
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(ii) said aromatic polyester polyol has a polyurethane foam reaction polymerization rate in a water/hydrocarbon co-blown system that is increased at least 295% by the presence of said urethane catalytic activity agent; or

5 (iii) said aromatic polyester polyol has a polyurethane foam reaction polymerization rate in a water blown system that is increased by the presence of said urethane catalytic activity agent.

10. The aromatic polyester polyol of claim 9 wherein said
polyurethane foam reaction polymerization rate is increased at least 400%
10 by the presence of said urethane catalytic activity agent.

11. The aromatic polyester polyol of claim 9 wherein said urethane catalytic activity agent comprises said non-alkoxylated aminoalcohol and said metal esterification catalyst.

12. The aromatic polyester polyol of claim 9 that has an average hydroxyl functionality of at least 2.0.

13. A blend comprising (i) one or more blowing agents, surfactants, catalysts, or a combination thereof and (ii) the aromatic polyester polyol of claim 9.

14. A polyisocyanurate foam prepared from the aromatic polyester
polyol of claim 9.

15. A polyurethane foam prepared from the aromatic polyester polyol of claim 9.

16. A process for producing an aromatic polyester polyol having an acid number below 3.0 mg/KOH/g, comprising reacting, at a temperature greater than 150 °C, a reaction mixture comprising:

- (a) an acid component;
- (b) a glycol component; and
- (c) a urethane catalytic activity agent that comprises a non-alkoxylated aminoalcohol.

30 17. A process for producing an aromatic polyester polyol having an acid number below 3.0 mg/KOH/g, comprising reacting, at a temperature greater than 150 °C, a reaction mixture comprising:

35 (a) an acid component;
(b) a glycol component; and
(c) an urethane catalytic activity agent comprising at least one of a
non-alkoxylated aminoalcohol and a metal esterification catalyst,
wherein:

(i) said aromatic polyester polyol has a polyurethane foam reaction polymerization rate in an HCFC-141b blown system that is increased at least 367% by the presence of said urethane catalytic activity agent;

5 (ii) said aromatic polyester polyol has a polyurethane foam reaction polymerization rate in a water/hydrocarbon co-blown system that is increased at least 295% by the presence of said urethane catalytic activity agent; or

10 (iii) said aromatic polyester polyol has a polyurethane foam reaction polymerization rate in a water blown system that is increased by the presence of said urethane catalytic activity agent.

15 18. The process of claim 16 or 17 wherein said acid component
comprises at least one of (a) ester-containing by-products from the
manufacture of dimethyl terephthalate, (b) scrap polyalkylene
terephthalates, (c) phthalic anhydride, (d) residues from the manufacture
of phthalic anhydride, (e) terephthalic acid, (f) residues from the
manufacture of terephthalic acid, (g) isophthalic acid, (h) trimellitic
anhydride and residue from the manufacture of, (i) aliphatic polybasic
acids or esters derived therefrom, and (j) by-products from the
20 manufacture of polyalkylene terephthalate.

19. The process of claim 16 or 17 wherein said glycol comprises ethylene glycol, propylene glycol, diethylene glycol, triethylene glycol, polyethylene glycol, dipropylene glycol, or a mixture thereof.

25 20. The process of claim 16 or 17 wherein said reacting comprises:
(i) an initial reaction at a pressure from 560 mmHg to atmospheric pressure; and

(ii) a completion reaction at a vacuum pressure of 50 to 200 mmHg or an azeotrope distillation using cyclohexane.

21. The process of claim 16 or 17 wherein said metal esterification
catalyst comprises manganese acetate, antimony oxide, lead oxide, tin
chloride, tin oxide, a titanate, or a combination thereof.

22. The process of claim 16 or 17 wherein said non-alkoxylated aminoalcohol is a non-alkoxylated tertiary aminoalcohol.

23. The process of claim 22 wherein said non-alkoxylated tertiary
35 aminoalcohol is triethanolamine.

34. The process of claim 16 or 17 wherein said reaction mixture

24. The process of claim 16 or 17 wherein said polyurethane further comprises a functionality enhancing component having a hydroxyl equivalent weight of 15 to 70.

25. The process of claim 24 wherein said functionality enhancing component comprises a non-alkoxylated glycerol, pentaerythritol, α -methylglucoside, sucrose, sorbitol, tri-methylolpropane, trimethylolethane, a tertiary aminoalcohol, or a mixture thereof.

5 26. A process for making a foam, comprising reacting the aromatic polyester polyol of claim 1 with an organic polyisocyanate in the presence of a surfactant and a blowing agent.

10 27. A process for making a foam, comprising reacting the aromatic polyester polyol of claim 9 with an organic polyisocyanate in the presence of a surfactant and a blowing agent.

15 28. A process for making a foam, comprising:
 (a) obtaining an aromatic polyester polyol having an acid number below 3.0 mg/KOH/g, wherein said aromatic polyester polyol is the reaction product of a reaction mixture comprising:
 an acid component;
 a glycol component; and
 a metal esterification catalyst,
 wherein said reaction product further comprises at least one of residue metal esterification catalyst and glycolates, carboxylates, and other coordination compounds of the metal; and
20 (b) reacting said aromatic polyester polyol with an organic polyisocyanate in the presence of a surfactant and a blowing agent,
 wherein said at least one of the residue metal esterification catalyst and glycolates, carboxylates, and other coordination compounds of the metal is not substantially removed prior to said reacting.

25 29. The process of claim 28 wherein said reaction mixture further comprises a non-alkoxylated aminoalcohol.